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NANTICOKE ENVIRONMENTAL COMMITTEE

1987 AIR QUALITY

DATA SUMMARY

MAY 1989

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Environment Ontario

Jim Bradley
Minister

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ISSN: 0835-9784

NANTICOKE ENVIRONMENTAL COMMITTEE

1987 AIR QUALITY DATA SUMMARY

F. Dobroff
Air Quality Assessment
West Central Region

May 1989

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ABSTRACT

This report summarizes the results of air monitoring in the vicinity of the major industrial complex in the City of Nanticoke in 1987.

The data showed that air quality in the area was usually excellent as most pollutants measured were well below relevant objectives.

Localized problems were related to odours and fugitive dust emissions from Stelco in Nanticoke Village. The Ontario Hydro Generating Station was the cause of short term sulphur dioxide fumigation episodes, but only 3 hours out of almost 100,000 hours of monitoring exceeded the SO_2 hourly objective.

Stelco has taken successful measures to reduce fugitive dust emissions but odorous reduced sulphur emissions need to be greatly reduced. The Ministry is conducting a special survey with a fixed total reduced sulphur (TRS) sampler on Stelco property to pinpoint the major source(s) of the odours. Based on the findings of this survey, the company will be required to submit an Action Plan to address the problem. The plan would include dates by which specific steps will be completed.

A Control Order was issued to Ontario Hydro in 1985 to reduce windblown dust emissions. The control program to date has been successful, evidenced by significant improvements in particulate measurements in 1987.

The other major industry in the area, Texaco Canada Inc., showed a mostly negligible impact on air quality.

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INTRODUCTION

The Nanticoke Environmental Management Program (NEMP) was formed in 1978 to co-ordinate a study of the background air quality and subsequent impact of industrial development on air quality in the area surrounding Nanticoke. NEMP was sponsored jointly by the Federal and Ontario Governments, Ontario Hydro, Stelco and Texaco. Beginning in 1984, the West Central Region of the Ontario Ministry of the Environment assumed responsibility for network operations from the Air Resources Branch. At that time, the monitoring network was reduced because air quality was generally good, and intensive monitoring in outlying areas was not warranted.

In mid-1985, NEMP and a similar group concerned with water quality were amalgamated into one organization called the Nanticoke Environmental Committee. All activities are now undertaken under NEC and a private contractor funded by Texaco and Stelco provides one technician to assist in maintaining the air monitoring network.

The purpose of the monitoring program is to determine compliance with provincial air quality criteria and also to measure the impact of the industrial development on the local air quality. Contaminants which may enter the area from outside sources are also identified.

The three main industries which have located in Nanticoke are Ontario Hydro's Thermal Generating Station, Texaco's oil refinery and Stelco's basic steel plant. A few smaller industries have located in the area as well.

NEC has undertaken to measure the ambient air concentrations of those compounds or substances that are regulated under the Provincial and Federal Environmental Protection Acts, and that could be a result of the Nanticoke industries' activities. The Ontario Ministry of the Environment's air quality criteria are set for the protection of human health and well being as well as to protect vegetation, animal life and property.

MONITORING NETWORK

Monitoring stations have been located to take into account predominant wind patterns and source location as well as to try to differentiate between industrial and other contributions.

A map of the 1987 network is shown in Figure 1, and the pollutants measured at each location are given in Table 1. Wind data (speed and direction) were measured at both Long Point and near Jarvis. Figure 2 displays the wind frequency distribution measured at Jarvis. Winds from the southwest sector tend to predominate. The Jarvis station's wind data were utilized in a computer program known as a "pollution rose" which is essentially a cross-tabulation of average hourly pollutant concentrations with wind direction. The pollution roses for individual stations are illustrated graphically on several maps in the report. For each "rose" presented, the length of individual lines drawn is proportional to the average concentration when the wind was blowing from that direction. The data from this program are a useful tool in identifying sources of pollutants.

In addition to the NEMP monitoring network, Ontario Hydro has operated its own network of sulphur dioxide analyzers since 1970. These data are referred to in this report.

In 1987, the Ministry network remained unchanged. However, in September, Ontario Hydro terminated three of their sulphur dioxide monitors. This now leaves five Hydro SO_2 samplers and five Ministry samplers in the network.

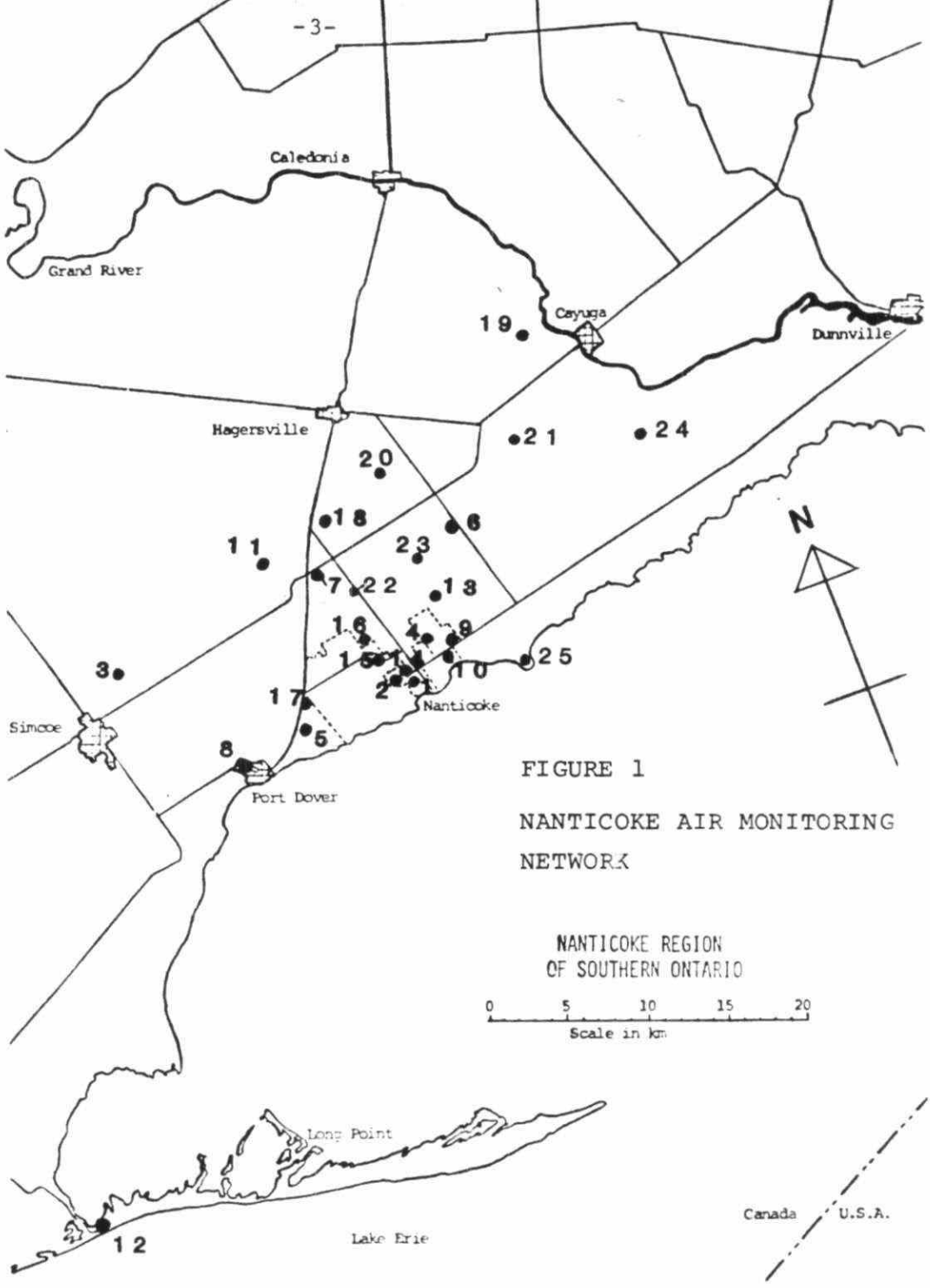


FIGURE 1

NANTICOKE AIR MONITORING NETWORK

NANTICOKE REGION
OF SOUTHERN ONTARIO

TABLE 1
MONITORING NETWORK

Map Ref.	Number	Location	SO_2	TSP	CHx	TRS	O_3	NOx	DF	F	Wind/Temp
1	22057	Nanticoke Creek								X	
2	22070	Nanticoke Village							X		
3	22071	Simcoe	X		X		X	X			
4	22074	Texaco								X	
5	22083	Dogs Nest								X	
6	22086	Cheapside	X			X		X			
7	22087	Jarvis		X							
8	22090	Port Dover		X							
9	22092	Rainham/Sandusk		X					X		
10	22093	N.G.S. Flyash Area							X		
11	22094	Townsend	X								
12	22901	Long Point	X				X	X			X

SO_2 - sulphur dioxide
TSP - total suspended particulate
CHx - hydrocarbons
TRS - total reduced sulphur
O_3 - ozone
NOx - oxides of nitrogen
DF - dustfall
F - fluoride

TABLE 1 (continued)
MONITORING NETWORK

Map Ref.	No.	Location	SO_2	TSP	CHx	TRS	O_3	NOx	DF	F	Wind/Temp
13	22904	S. Walpole School	X(O.H.)	X	X	X					
14	22907	Nanticoke Village	X	X	X	X					
15	22961	Nanticoke North		X						X	
16	22964	Stelco North		X							
17	22965	Dogs Nest/Hwy. 6		X							
18	22883	Jarvis Met Tower (Ontario Hydro)									X
19	22908	Decewsville(O.H.)	X								
20	22910	Garnet(O.H.)	X								
21	22911	Balmoral(O.H.)	X								
22	22913	Nanticoke Rd.(O.H.)	X								
23	22914	Sandusk(O.H.)	X								
24	22915	Kohler(O.H.)	X								
25	22919	Peacock Pt.(O.H.)	X								

SO_2 - sulphur dioxide
TSP - total suspended particulate
CHx - hydrocarbons
TRS - total reduced sulphur
O_3 - ozone
NOx - oxides of nitrogen
DF - dustfall
F - fluoride

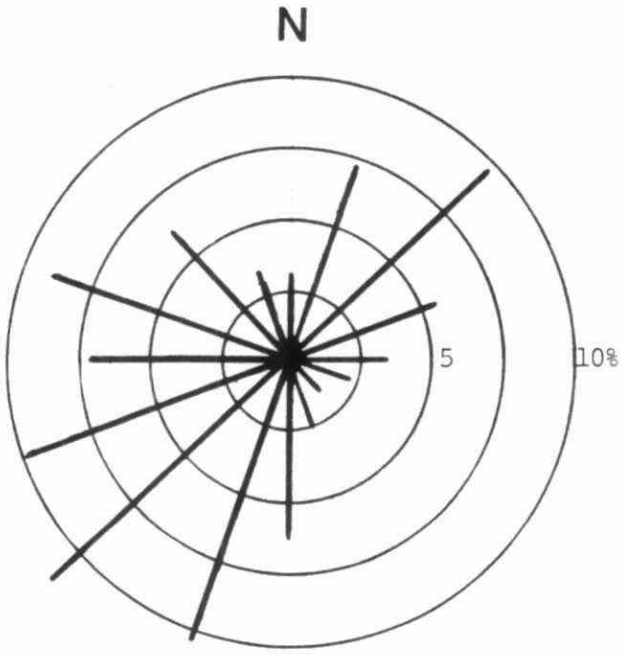
FIGURE 2

WIND FREQUENCY DISTRIBUTION

10 METRE LEVEL

JARVIS

ONT.HYDRO MET. TOWER



Lines indicate direction wind blew from

ANALYSIS OF DATA

Sulphur Dioxide

Sulphur dioxide (SO_2) was measured continuously at five sites within the NEC network and at eight Ontario Hydro stations in 1987. In September, three of the Hydro monitors were terminated for economic reasons at Garnet, Decewsville and Peacock Point. All of the stations easily met the annual and daily air quality objectives of .02 and .10 ppm respectively. Data from the Ministry monitors are given in Table 2a and data for the Hydro monitors are in Table 2b. Out of a total of almost 100,000 hours of monitoring, the 1-hour objective of .25 ppm was exceeded twice during consecutive hours at Hydro monitor NNE16-Balmoral, and once at Hydro monitor NNE20 at Decewsville. Each exceedence was caused by short term fumigations resulting from the Generating Station's plume. Several other similar fumigation incidents were observed at other stations, but these did not exceed the hourly objective.

Pollution roses for SO_2 in Figure 3 for the five Ministry monitors generally showed a measurable but minor long-term impact from the Nanticoke industries as highest averages were generally related to winds from the industrial area. These averages, however, were quite low and well within objectives.

Figure 4 illustrates the historical trend of sulphur dioxide annual average concentrations of six SO_2 monitors which have operated continuously since 1976. Concentrations can be seen to be very uniform over this period with no deterioration in concentrations. Similarly in Figure 5, the number of hourly exceedences per year at these six stations is shown. Only random fluctuation is apparent although a decline in the curve is apparent.

Total Reduced Sulphur

Total Reduced Sulphur (TRS) was monitored at three locations - in Nanticoke Village, at South Walpole School on Sandusk Rd. and on Cheapside Rd. just south of Highway 3. There are no general

TABLE 2a
SULPHUR DIOXIDE
UNITS - PARTS PER MILLION
MINISTRY OF ENVIRONMENT MONITORS

Ontario Objectives: 1-hour - .25
24-hour - .10
1-year - .02

		Annual Average	Maximum 1-hour	Maximum 24-hour	No. of Times Above Objective 1-hour	No. of Times Above Objective 24-hour
22071 Simcoe	1987	.003	.10	.02	0	0
	1986	.003	.12	.02	0	0
	1985	.005	.10	.03	0	0
22086 Cheapside	1987	.002	.24	.04	0	0
	1986	.002	.33	.03	2	0
	1985	.003	.19	.03	0	0
22094 Townsend	1987	.002	.19	.03	0	0
	1986	.004	.26	.06	1	0
	1985	.004	.19	.04	0	0
22901 Long Point	1987	.002	.17	.02	0	0
	1986	.002	.07	.03	0	0
	1985	.002	.12	.02	0	0
22907 Nanticoke Village	1987	.003	.14	.04	0	0
	1986	.002	.16	.03	0	0
	1985	.002	.11	.02	0	0

TABLE 2b
SULPHUR DIOXIDE
UNITS - PARTS PER MILLION
ONTARIO HYDRO MONITORS

Ontario Objectives: 1-hour - .25
24-hour - .10
1-year - .02

		Annual Average	Maximum 1-hour	No. of Times Above Objective 1-hour	24-hour
22908 Decewsville (NNE 20)	1987	.005	.36	1	0
	1986	.005	.15	0	0
	1985	.004	.27	1	0
22910 Garnet (N15)	1987	.004	.15	0	0
	1986	.004	.10	0	0
	1985	.004	.14	0	0
22911 Balmoral (NNE16)	1987	.006	.32	2	0
	1986	.006	.20	0	0
	1985	.005	.26	1	0
22913 Nanticoke Rd. (NNW08)	1987	.005	.21	0	0
	1986	.004	.39	2	0
	1985	.004	.23	0	0
22914 Sandusk (N07)	1987	.005	.23	0	0
	1986	.006	.15	0	0
	1985	.006	.17	0	0
22915 Kohler (NE19)	1987	.004	.09	0	0
	1986	.004	.17	0	0
	1985	.004	.14	0	0
22916 Walpole South School (NNE05)	1987	.006	.25	0	0
	1986	.006	.24	0	0
	1985	.006	.23	0	0
22919 Peacock Pt. (E05)	1987	.003	.13	0	0
	1986	.004	.13	0	0
	1985	.005	.19	0	0

Decewsville, Garnet and Peacock Pt. monitors terminated in Sept. 1987

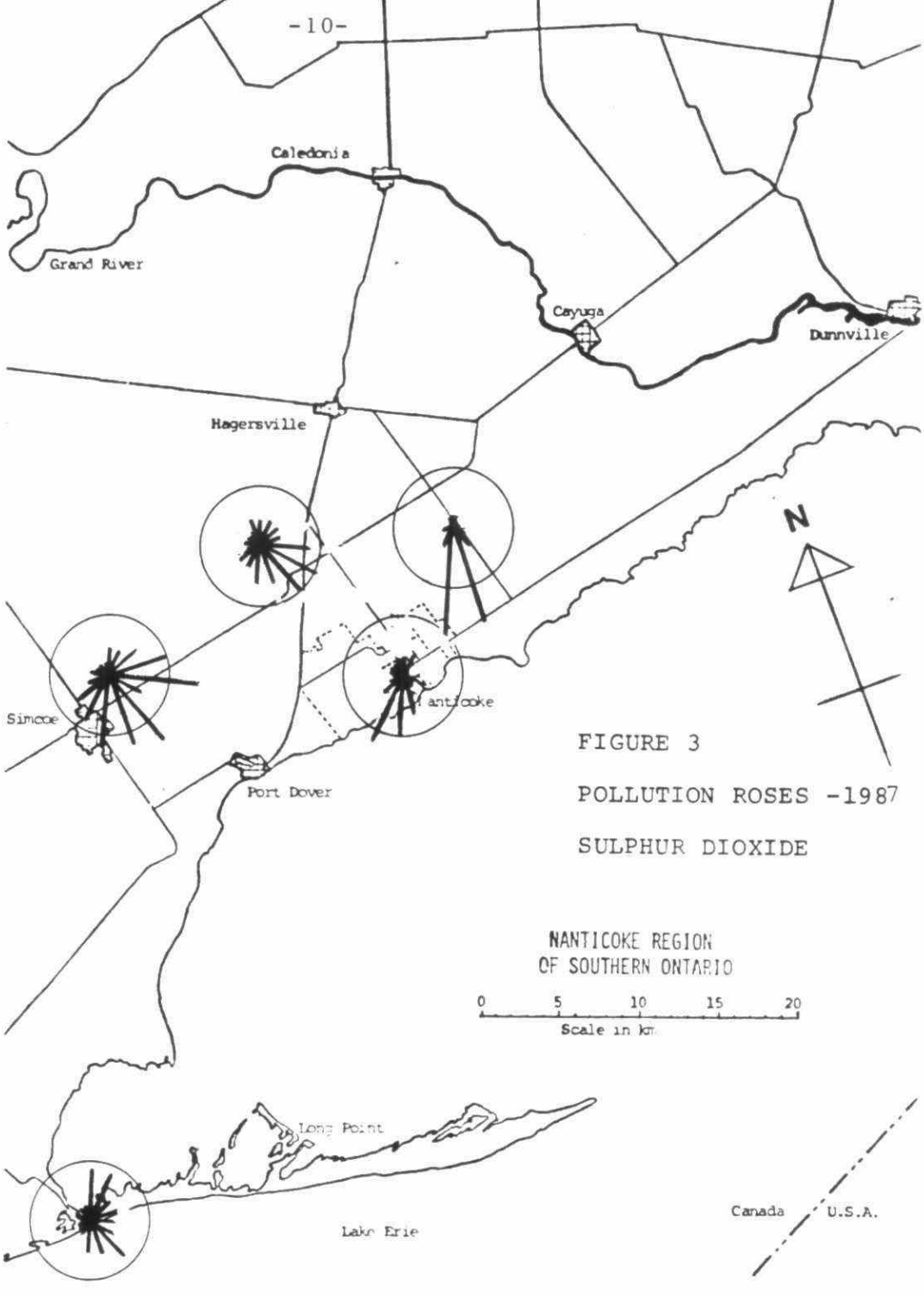


FIGURE 3

POLLUTION ROSES -1987

SULPHUR DIOXIDE

Scale : ppm

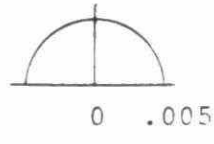


FIGURE 4

SULPHUR DIOXIDE YEARLY TREND

NANTICOKE 1976 – 1987

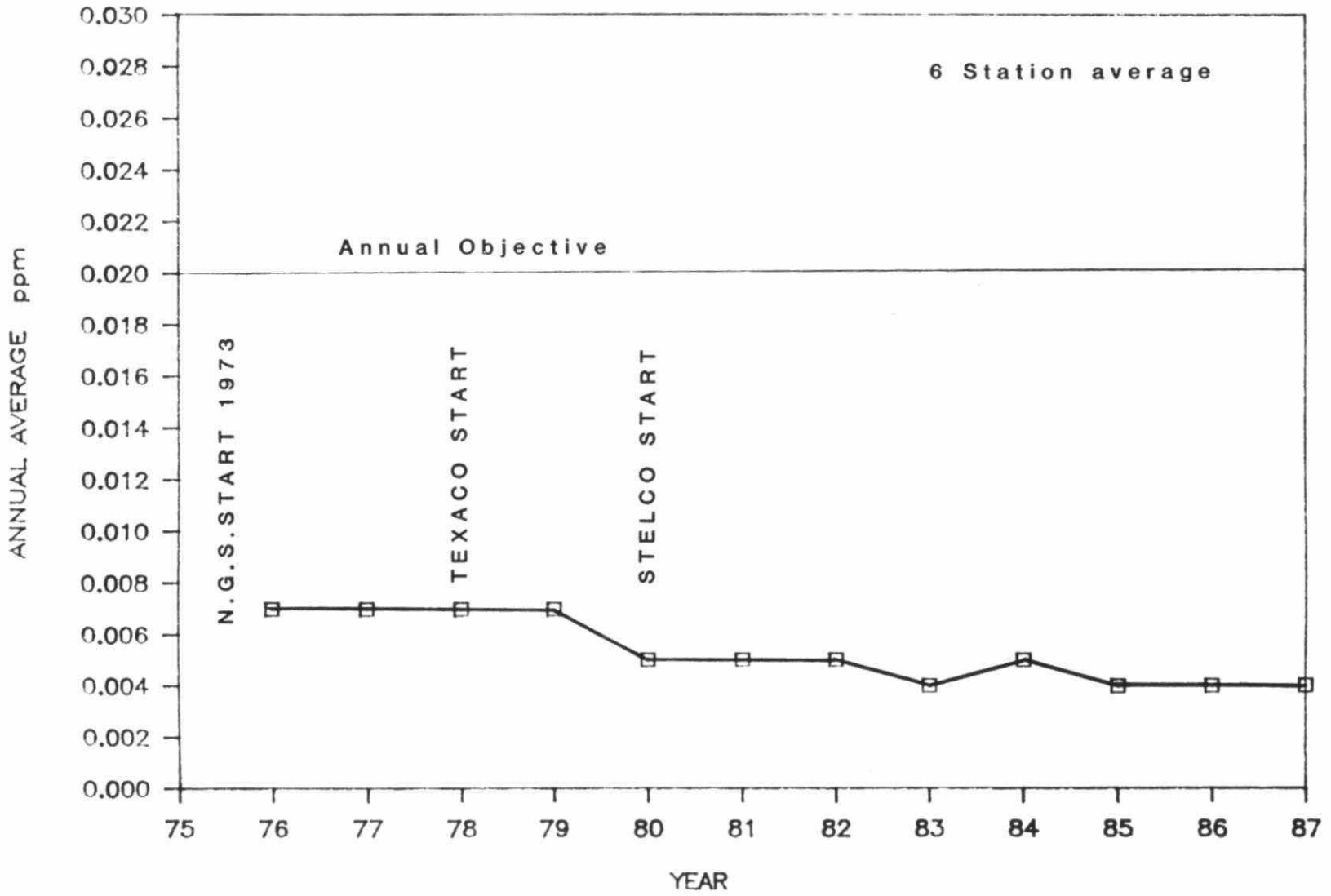
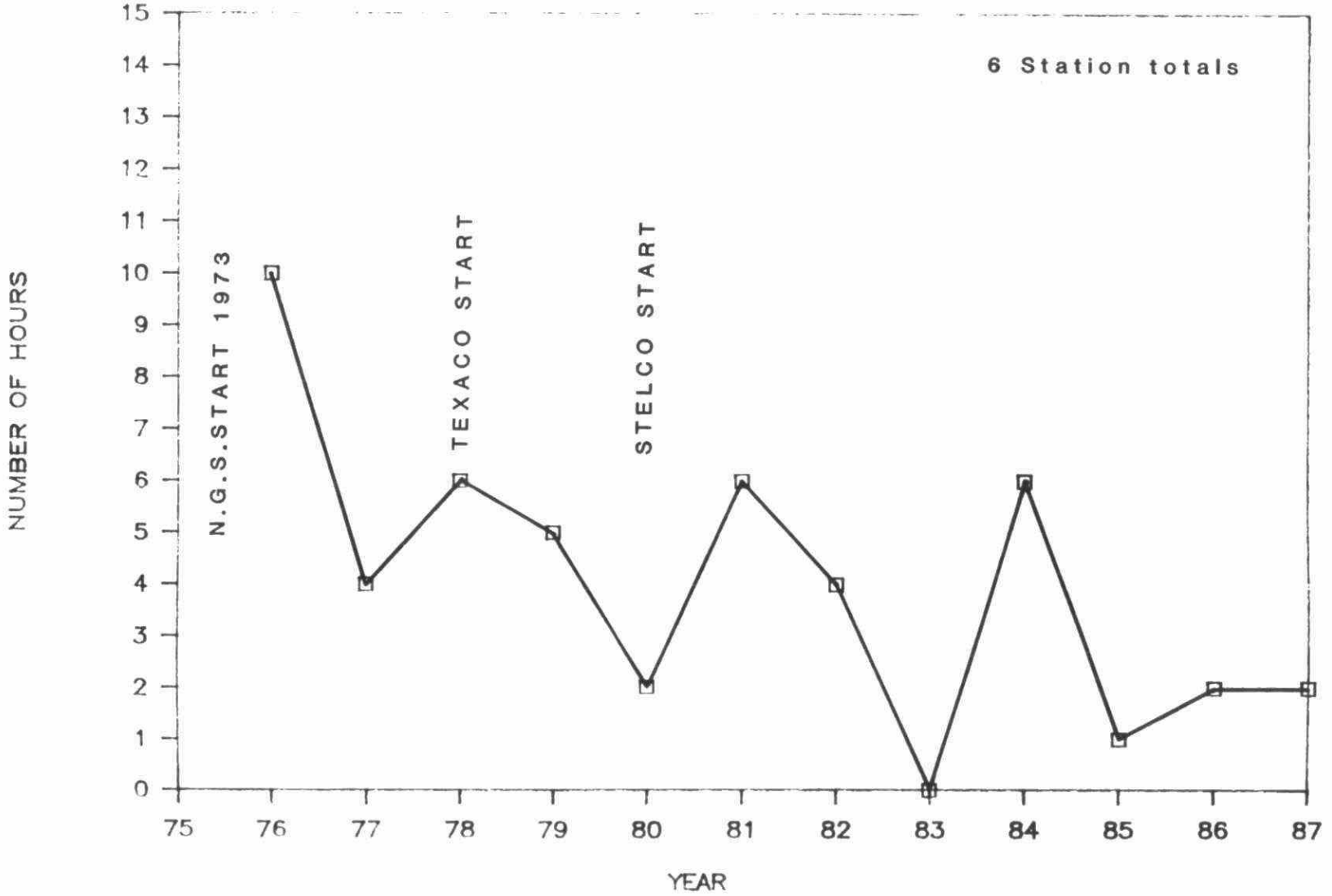


FIGURE 5

SO2 EXCEEDENCE TREND – NANTICOKE

HOURS OVER .25 PPM



criteria for TRS but there is an hourly objective for hydrogen sulphide (H_2S), the "rotten egg" gas, of 20 ppb, which is based on its odour threshold. The monitoring instrument measures H_2S, and many other sulphur compounds.

Sources of these pollutants include slag quenching activities and the coke ovens/by-products plant at Stelco and fuel oil storage tanks and a sulphur recovery operation at Texaco. Apart from industrial sources, sulphur compounds can be liberated from groundwaters that have been contaminated by natural seepages or from leaking natural gas wells, known to exist in the area. Stelco sulphide emissions have been shown to consist primarily of H_2S and thus, comparison of TRS data to the H_2S objective, particularly within Nanticoke Village when downwind of Stelco, is reasonable. Texaco emissions have been less well characterized but are not believed to consist primarily of H_2S. Other organic sulphur compounds are probably present in their emissions and consequently levels downwind of Texaco cannot be rightfully compared to the H_2S standard. The TRS data are summarized in Table 3.

In 1987, TRS levels remained very low at the South Walpole School and Cheapside stations. Nanticoke Village worsened from 1986 and showed the highest levels. Yearly trends are illustrated for each station in Figure 6, the trend in the number of hours exceeding an arbitrary flag concentration of 10 ppb which is the approximate odour threshold for H_2S.

The Cheapside station recorded only 4 hours above this concentration in 1987 and none above the hourly H_2S objective (20 ppb) as given in Table 3. The South Walpole School monitor recorded 16 hours above 10 ppb and 5 hours above 20 ppb (out of over 7,000 hourly readings), both a slight increase from the previous years. Almost all of these concentrations coincided with equally high or higher levels measured at the Nanticoke Village Station. This, together with the southwest wind conditions, implies that Stelco, not Texaco may have been the source of the elevated levels measured at the school.

TABLE 3
TOTAL REDUCED SULPHUR
UNITS - PARTS PER BILLION

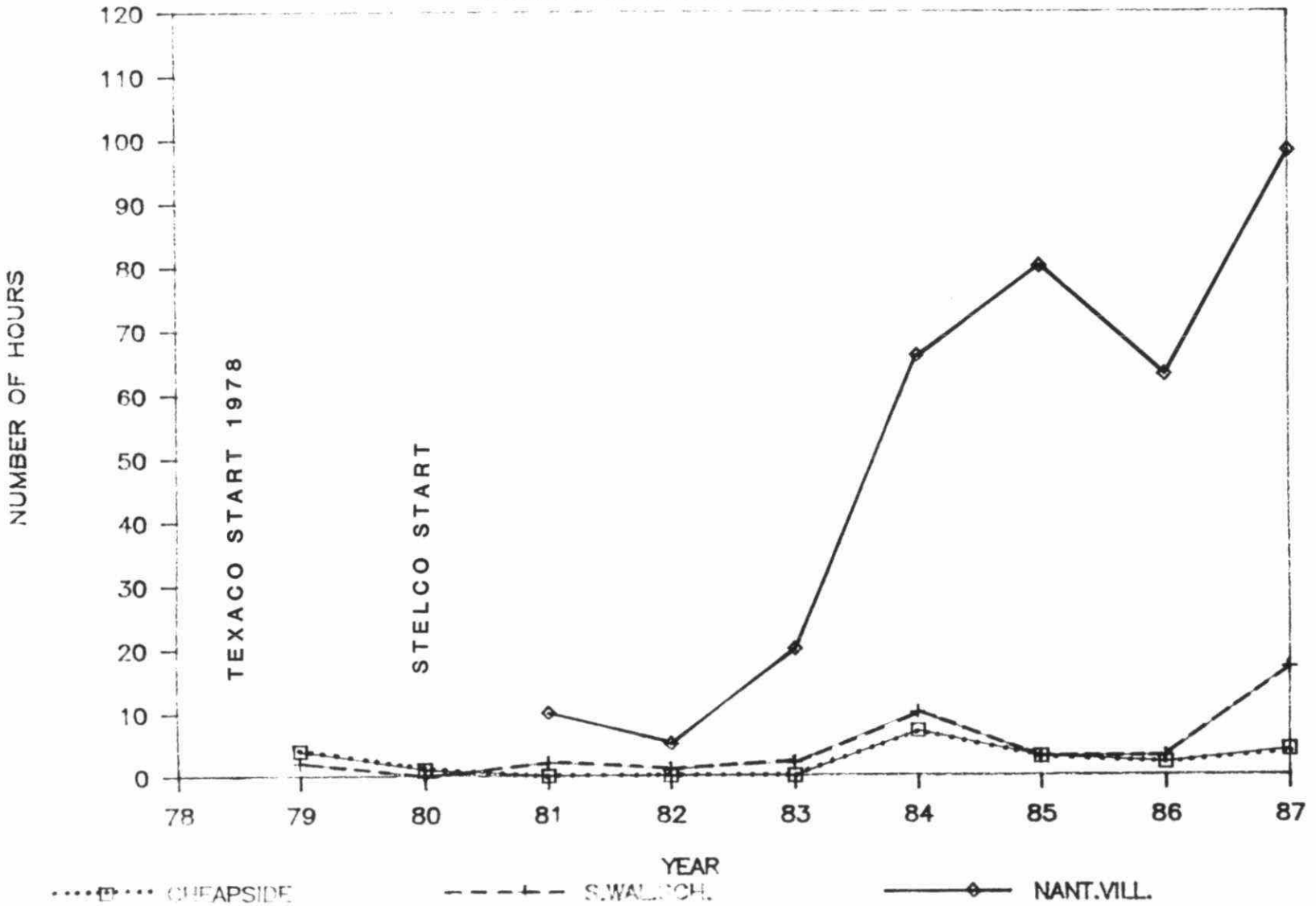
Ontario Objective: 1-hour -20
(Hydrogen Sulphide)

			Annual Average	Maximum 1-hour	No. of Hours Above	
					20 ppb	10 ppb
22086	Cheapside	1987	.2	17	0	4
		1986	.4	14	0	2
		1985	.3	51	2	3
22904	South Walpole School	1987	.2	28	5	16
		1986	.1	13	0	3
		1985	.2	20	0	3
22907	Nanticoke Village	1987	1.3	55	29	100
		1986	.8	51	19	63
		1985	1.1	54	17	80

FIGURE 6

TOTAL REDUCED SULPHUR EXCEEDENCE TREND

HOURS OVER 10 PPB NANTICOKE



Levels recorded in Nanticoke Village close to Stelco were much higher on average. There were 100 hours above the flag concentration of 10 ppb here and the hourly H_2S objective (20 ppb) was exceeded during 29 hours during the year. This was an increase from previous years.

The pollution rose in Figure 7 for Nanticoke Village shows a very strong TRS impact from Stelco. The roses for the Cheapside and school sites show only minor industrial impact.

As shown in Figure 6, higher concentrations in Nanticoke Village TRS are plainly evident since 1982. Preliminary 1988 data indicate even further deterioration. Discussions with Stelco have been undertaken in order to identify and reduce TRS emissions. The company lengthened their slag quenching pit in 1987, which served to increase the surface area of slag allowing for more air cooling, thus lessening quench emissions. However, this measure has been unsuccessful in improving air quality. In August, 1988, Stelco shut down their blast furnace for a major reline. This eliminated all slag quenching. Data will determine whether this shutdown significantly improved air quality in Nanticoke Village. Since there are two potential sources of TRS at Stelco (the coke ovens/by-products plant is the other) a special survey with a fixed TRS sampler between the two sources on Stelco property is being conducted, so as to determine which source or sources is significant. Based on the findings of this survey, Stelco will be required to submit an Action Plan to address the source(s) of TRS. Included would be dates by which specific steps will be completed.

Oxides of Nitrogen

Oxides of nitrogen result from high temperature combustion sources including the automobile. The most abundant oxides are nitric oxide (NO) which is largely a direct emission of fuel burning and nitrogen dioxide (NO_2) which is mostly an oxidation product once the contaminant is airborne. Objectives exist only for nitrogen dioxide and are based on odour threshold levels (hourly-.2 ppm) and health effects (24-hour - .1 ppm). Other adverse effects occurring at higher levels include vegetation damage, reduced visibility and corrosion of metals.

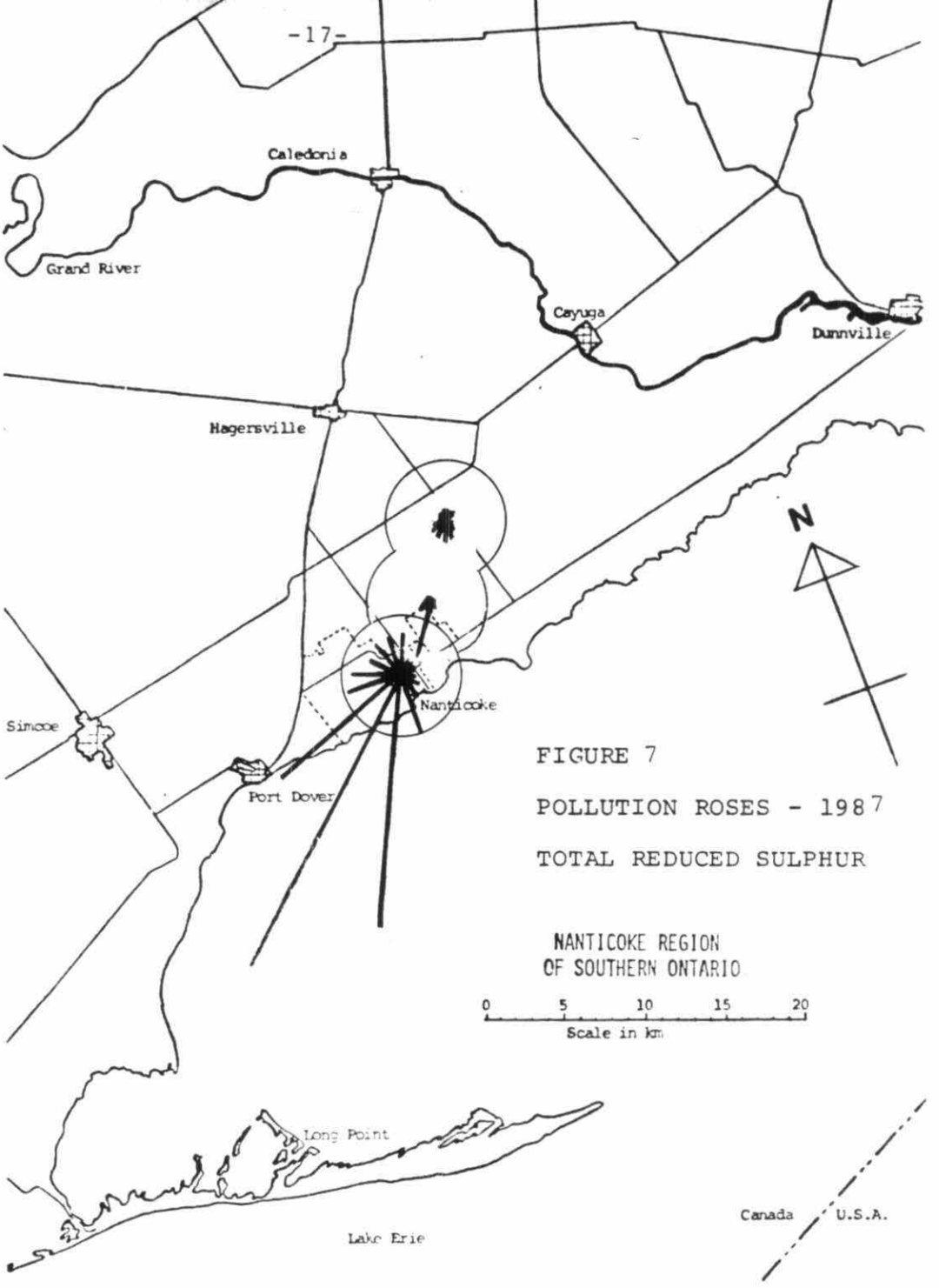


FIGURE 7

POLLUTION ROSES - 1987

TOTAL REDUCED SULPHUR

Scale : ppb

0 1

Data for NO_2 and NO for three stations are summarized in Tables 4 and 5. Levels in 1987 continued to be very low and well within objectives. There have never been any NO_2 exceedences measured. The pollution roses for NO_2 in Figure 8 indicate little contribution from the Nanticoke industries. Road traffic is likely as much a factor as industrial emissions.

Yearly trends of NO_2 for the three stations are given in Figure 9. In the past few years a trend to decreasing concentrations is apparent although a minor increase occurred at the Long Point station in 1986 and 1987 for reasons unknown.

Data in Table 5 show a significant increase in the NO average in 1987 at the Cheapside station and levels were highest in tne summer. There were no peak incidents recorded, only a general slight increase in baseline values. This could either indicate changed instrument performance (the instrument was changed in mid-year) or an actual slight change in background concentrations. In any case, the levels were very low. Conversely, the NO_2 average actually decreased at Cheapside in 1987.

Hydrocarbons

Ambient hydrocarbons can come from vehicular traffic, seepages at natural gas wells, natural by-products of vegetation, the commercial processing and transportation of refined petroleum products (Texaco) and coking operations (Stelco).

The hydrocarbon monitor measures a large spectrum of individual compounds with varying adverse impacts. Since the mixture of compounds will vary from place to place, it has not been possible to apply a guideline or objective for this parameter.

The instrument separates the hydrocarbons into two fractions-methane and non-methane. The latter are referred to as "reactive" hydrocarbons (RHC) and data for reactive hydrocarbons for three stations are given in Table 6.

In 1987, concentrations of reactive hydrocarbons remained low and unchanged at the South Walpole School site-22904 and Nanticoke

TABLE 4
NITROGEN DIOXIDE
UNITS - PARTS PER MILLION

Objectives: 1-hour - .20
24-hour - .10

		Annual Average	Maximum 1-hour	Maximum 24-hour	No. of Times Above Objective 1-hour	No. of Times Above Objective 24 hour
22071 Simcoe	1987	.005	.08	.02	0	0
	1986	.005	.09	.04	0	0
	1985	.006	.08	.03	0	0
22086 Cheapside	1987	.002	.03	.02	0	0
	1986	.005	.07	.03	0	0
	1985	.003	.05	.03	0	0
22901 Long Point	1987	.008	.06	.04	0	0
	1986	.007	.06	.03	0	0
	1985	.004	.06	.03	0	0

TABLE 5
NITRIC OXIDE
UNITS - PARTS PER MILLION

		Annual Average	Maximum 1-hour	Maximum 24-hour
22071 Simcoe	1987	.005	.04	.01
	1986	.007	.10	.03
	1985	.004	.12	.02
22086 Cheapside	1987	.008	.10	.04
	1986	.001	.13	.02
	1985	.001	.07	.02
22901 Long Point	1987	.003	.06	.03
	1986	.000	.04	.02
	1985	.001	.08	.01

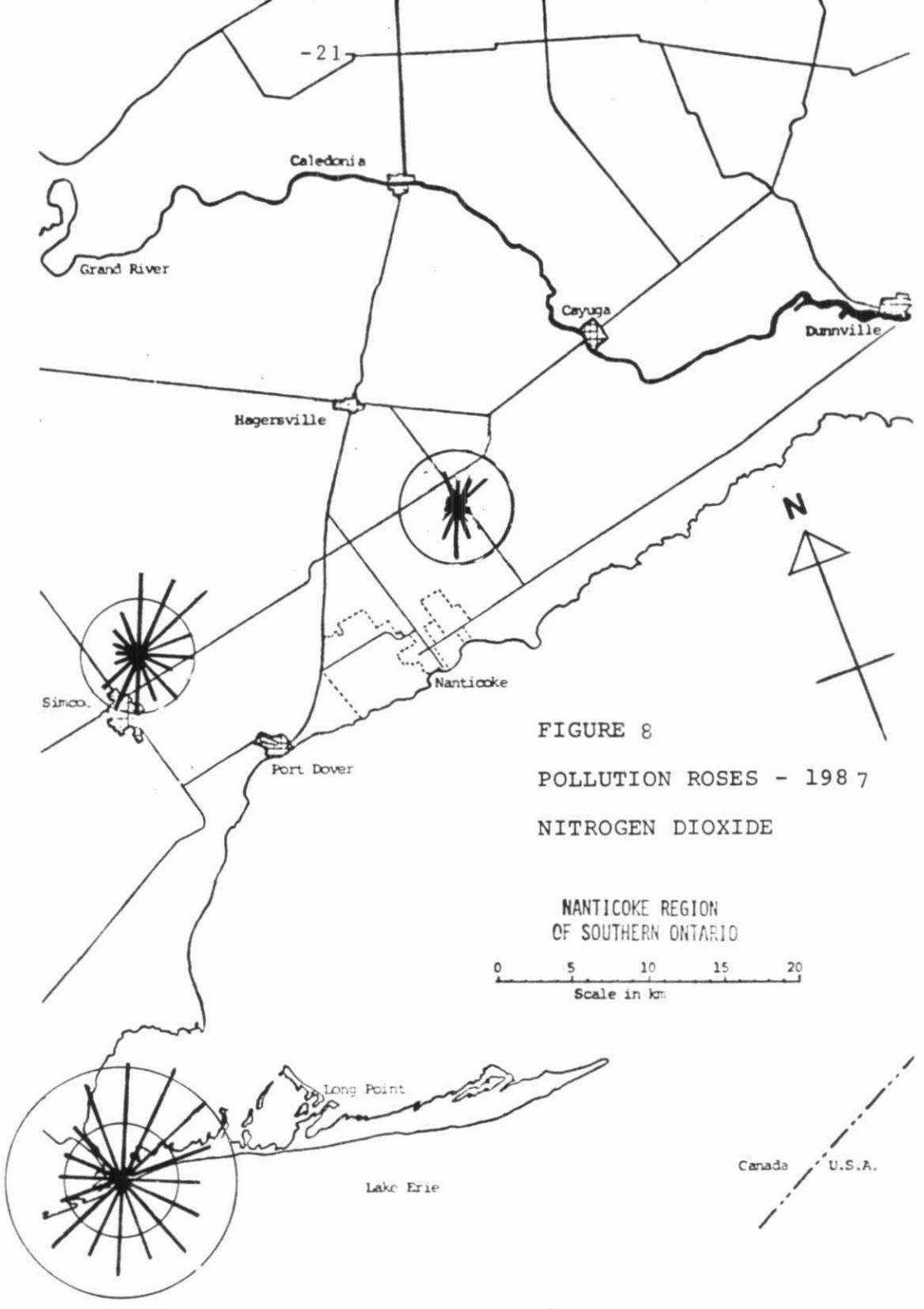


FIGURE 8

POLLUTION ROSES - 1987

NITROGEN DIOXIDE

FIGURE 9

NITROGEN DIOXIDE YEARLY TREND

NANTICOKE 1976 – 1987

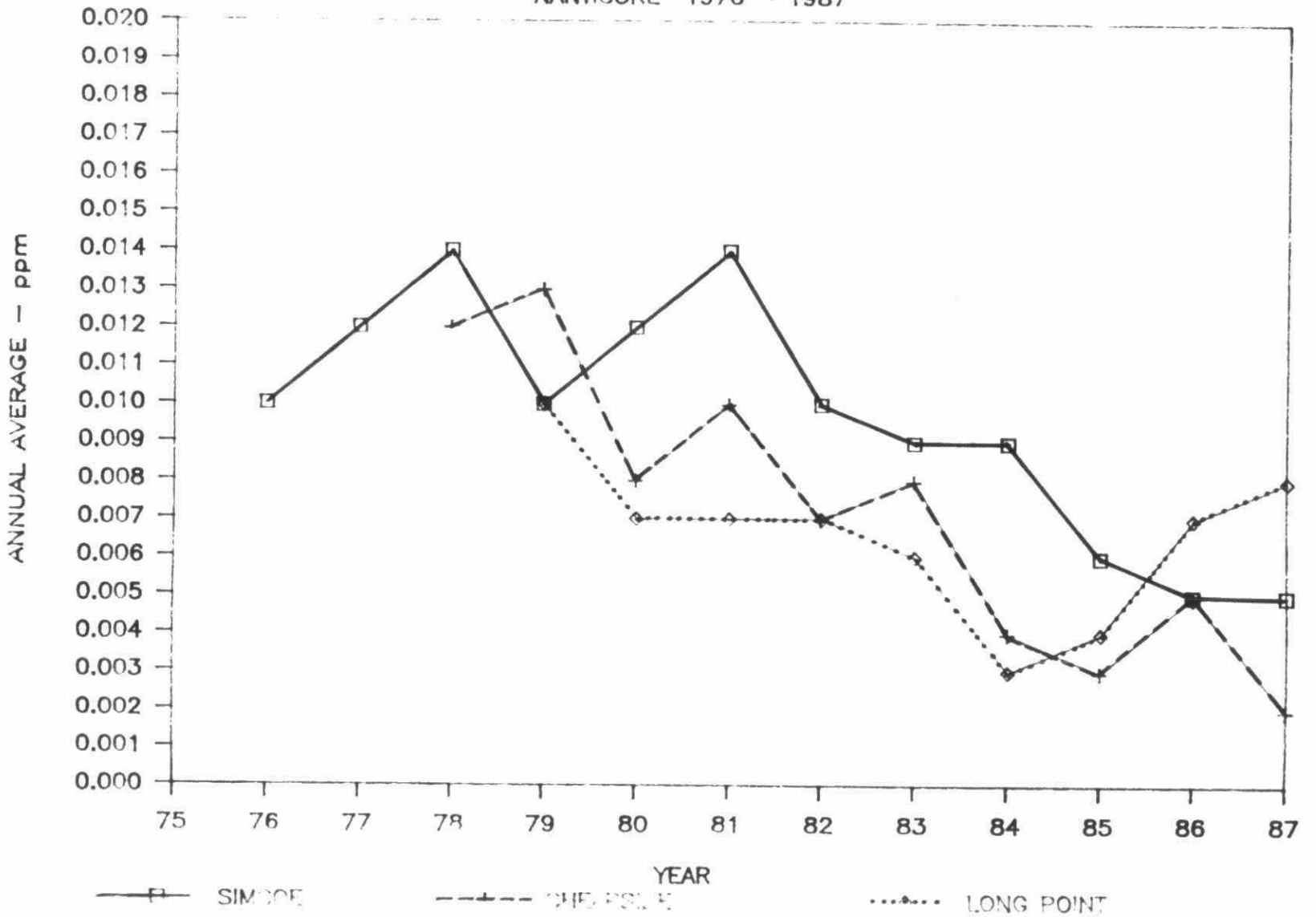


TABLE 6
NON-METHANE HYDROCARBONS
UNITS - PARTS PER MILLION

			Annual Average	Maximum 1-hour	Maximum 24-hour
22071	Simcoe	1987	.12	0.7	0.3
		1986	.17	0.6	0.3
		1985	.22	0.8	0.4
22904	South Walpole School	1987	.10	1.0	0.3
		1986	.09	1.5	0.4
		1985	.06	3.0	0.4
22907	Nanticoke Village	1987	.13	0.5	0.3
		1986	.11[7]	0.8	0.3

7 - 7 month average (June - December)

Village (22907). The pollution roses in Figure 10 show a minor impact from Texaco at the school site while Stelco's impact on the Nanticoke Village site also appears minor. Significantly higher levels were measured at Simcoe (22071) remote from the industrial zone, but the rose in Figure 10 shows uniform concentrations from all directions. The higher levels may either be due to technical instrument problems or less likely, to some local sources such as vehicle emissions.

Yearly trends for Simcoe and the school site are given in Figure 11. The decreasing trend of reactive hydrocarbons at the school should be overlooked since data prior to 1984 are believed to be in error due to instrumentation problems. RHC levels have probably remained stable as indicated by the Simcoe curve.

Ozone

Oxidants are products of photochemical reactions involving oxides of nitrogen, hydrocarbons and sunlight. Ozone (O_3) accounts for most of the oxidants produced, and the sources of the precursor pollutants are mainly industrial and automotive. Ozone is injurious to different types of vegetation including tobacco and tomato crops. The 1-hour objective for ozone (.08 ppm) is based on vegetation effects, but ozone can have adverse human health effects at higher levels.

Ozone concentrations follow very definite annual and daily trends. Highest levels occur during the summer (May to September), and the daily maxima usually occur during mid-afternoon. Both patterns are directly related to temperature and the amount and intensity of sunlight.

Ozone concentrations were measured at two sites and data are summarized in Table 7. In 1987, concentrations were similar to previous years. There were 139 exceedences of the hourly objective observed at Long Point and 72 at Simcoe. Elevated levels generally occurred at the same time at both stations during the summer with slightly higher concentrations measured at Long Point during southerly winds indicating that the high

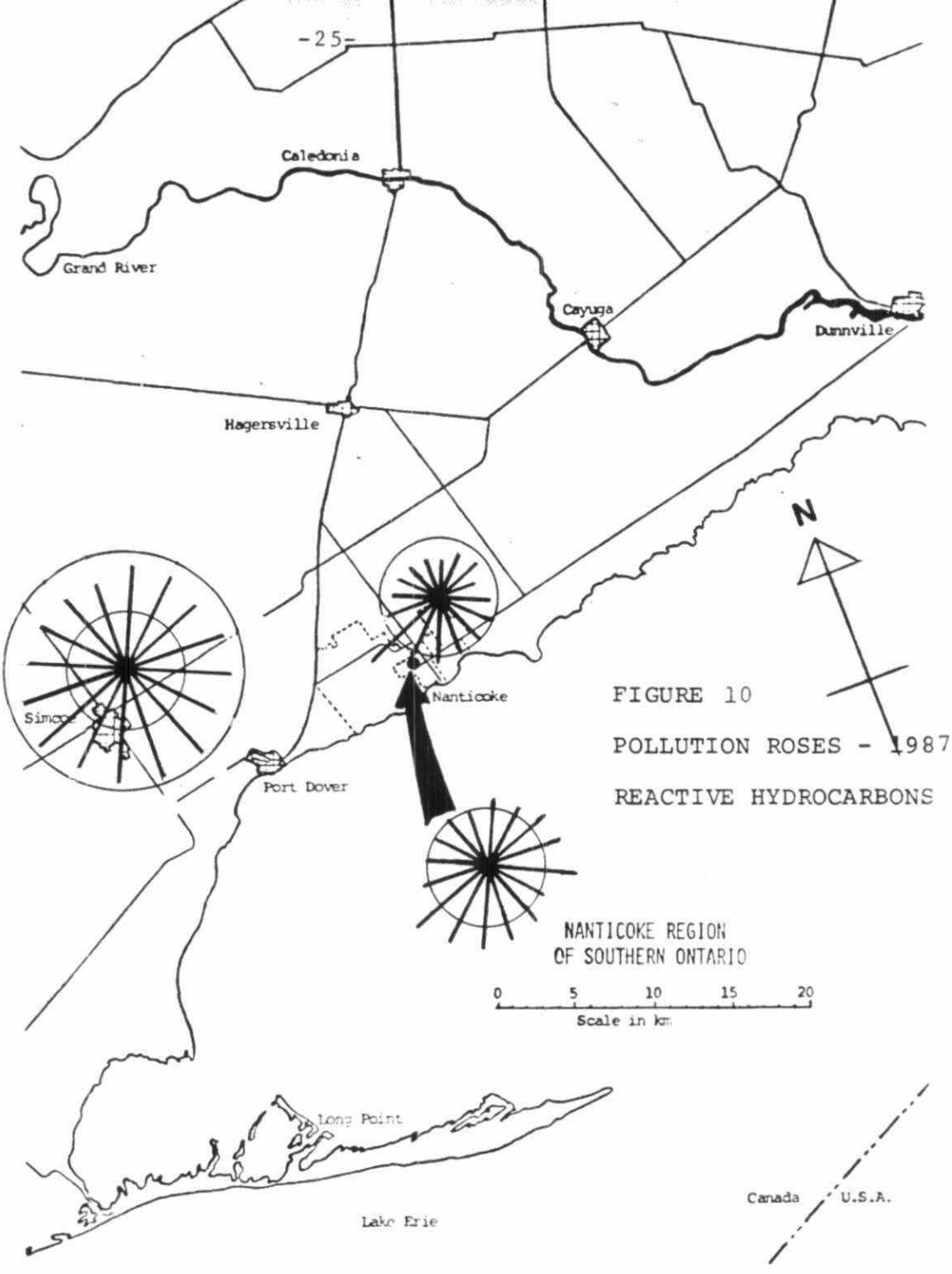


FIGURE 10

POLLUTION ROSES - 1987

REACTIVE HYDROCARBONS

Scale : ppm

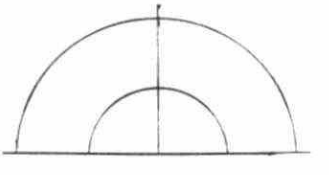


FIGURE 11

REACTIVE HYDROCARBONS YEARLY TREND

NANTICOKE 1980 -- 1987

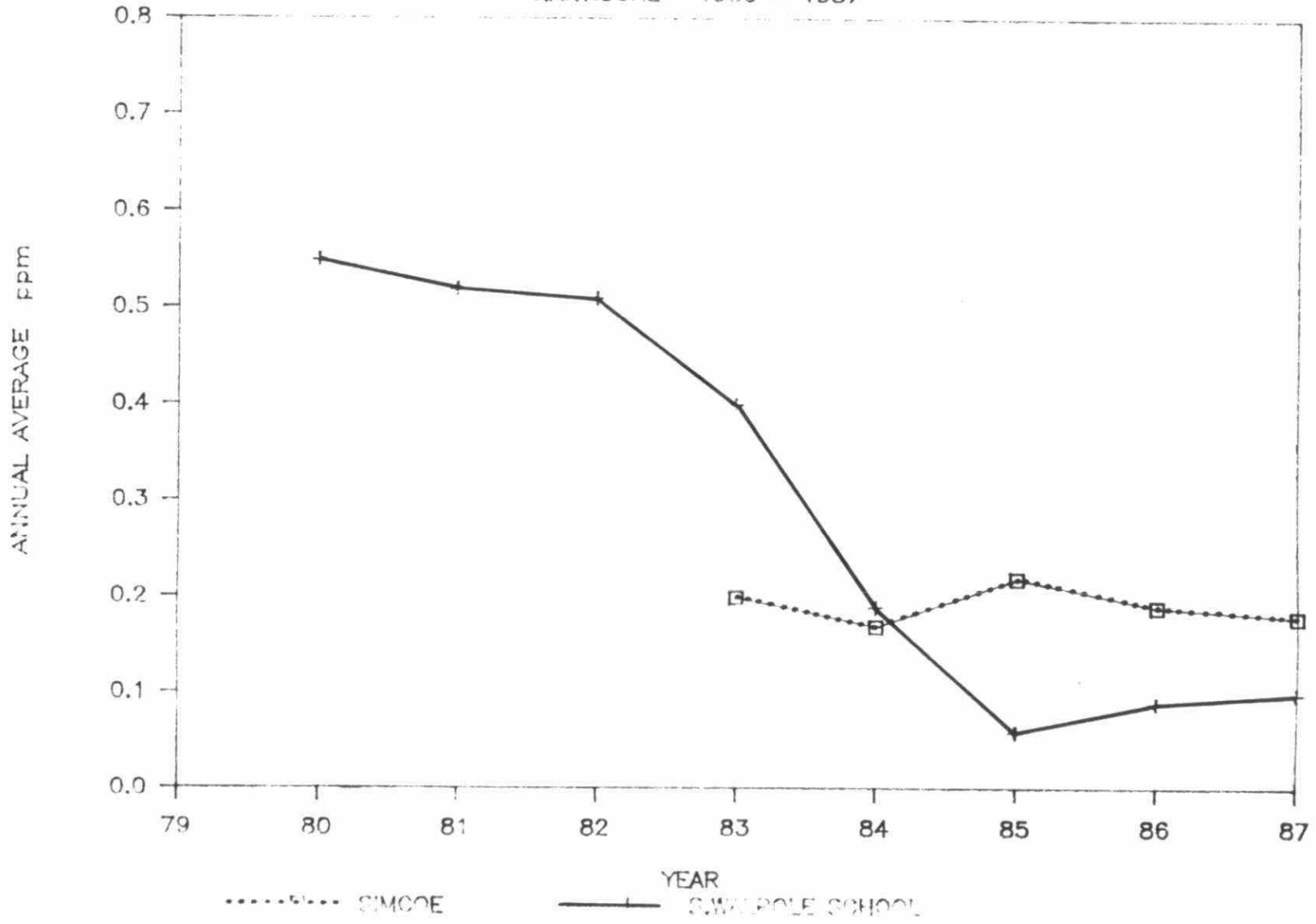


TABLE 7
OZONE
UNITS - PARTS PER MILLION Ontario Objective: 1-hour - .08

		Annual Average	Maximum 1-hour	No. of Hours Above Objective
22071 Simcoe	1987	.028	.117	72
	1986	.028	.105	53
	1985	.031	.118	71
22901 Long Point	1987	.032	.132	139
	1986	.031	.124	165
	1985	.034	.135	183

concentrations were imported from the United States. There were 31 separate days during the summer in which one or both stations exceeded the hourly objective.

The pollution roses in Figure 12 only partially confirm that the highest levels occurred under winds from the south and southeast because the relative magnitudes were not that much greater than for other directions. Elevated concentrations do not automatically occur with southerly winds, even during the summer. Specific meteorological conditions are necessary, namely, hot, sunny weather.

The yearly trend graph of hourly exceedences at the two stations in Figure 13 indicates random fluctuations which are probably related to climatological variation.

Ozone, hydrocarbons and oxides of nitrogen can be transported over great distances and can be augmented by local sources. It is generally believed that the ozone problem in Southern Ontario is due to long range transport from the United States and thus will have to be resolved on an international rather than local scale.

Total Suspended Particulates

Total suspended particulates (TSP) are measured with high volume samplers which draw a known volume of air through a pre-weighed filter for a 24 hour period (midnight to midnight). The exposed filter is weighed, and the difference (weight of solids on filter) in conjunction with the known air volume sampled is used to calculate a TSP concentration in micrograms per cubic metre. The objective for a 24 hour average is 120 ug/m^3 while the yearly geometric mean objective is 60 ug/m^3. The samplers operate once every six days.

Data from total suspended particulate measurements at eight locations are summarized in Table 8. At two of the stations, the daily objective of 120 ug/m^3 was not exceeded - 22092-Rainham/Sandusk and 22964-Stelco North. The yearly objective of 60 ug/m^3 was met at all stations.

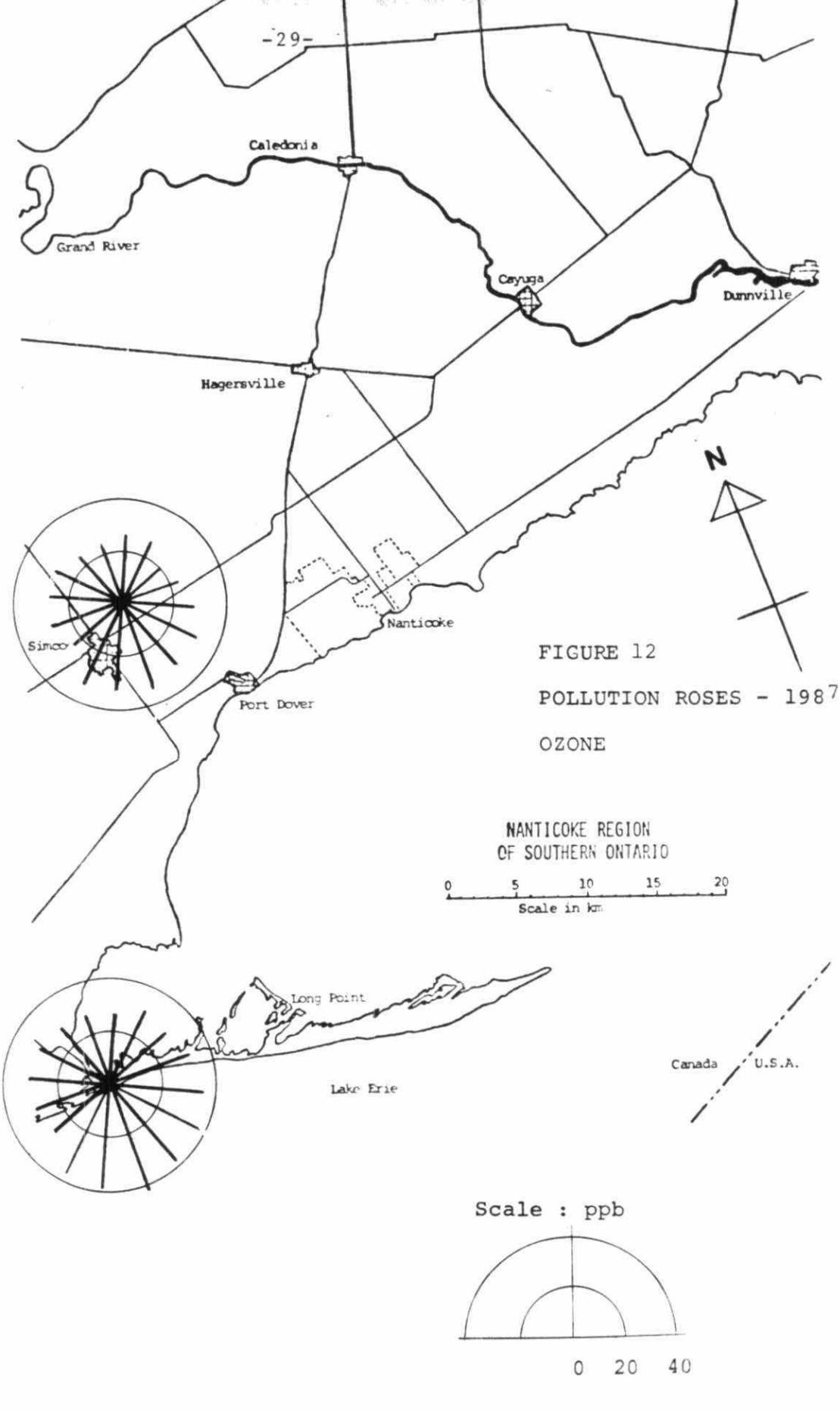


FIGURE 12

POLLUTION ROSES - 1987

OZONE

FIGURE 13

OZONE EXCEEDENCE TREND

HOURS OVER 80 PPB – NANTICOKE

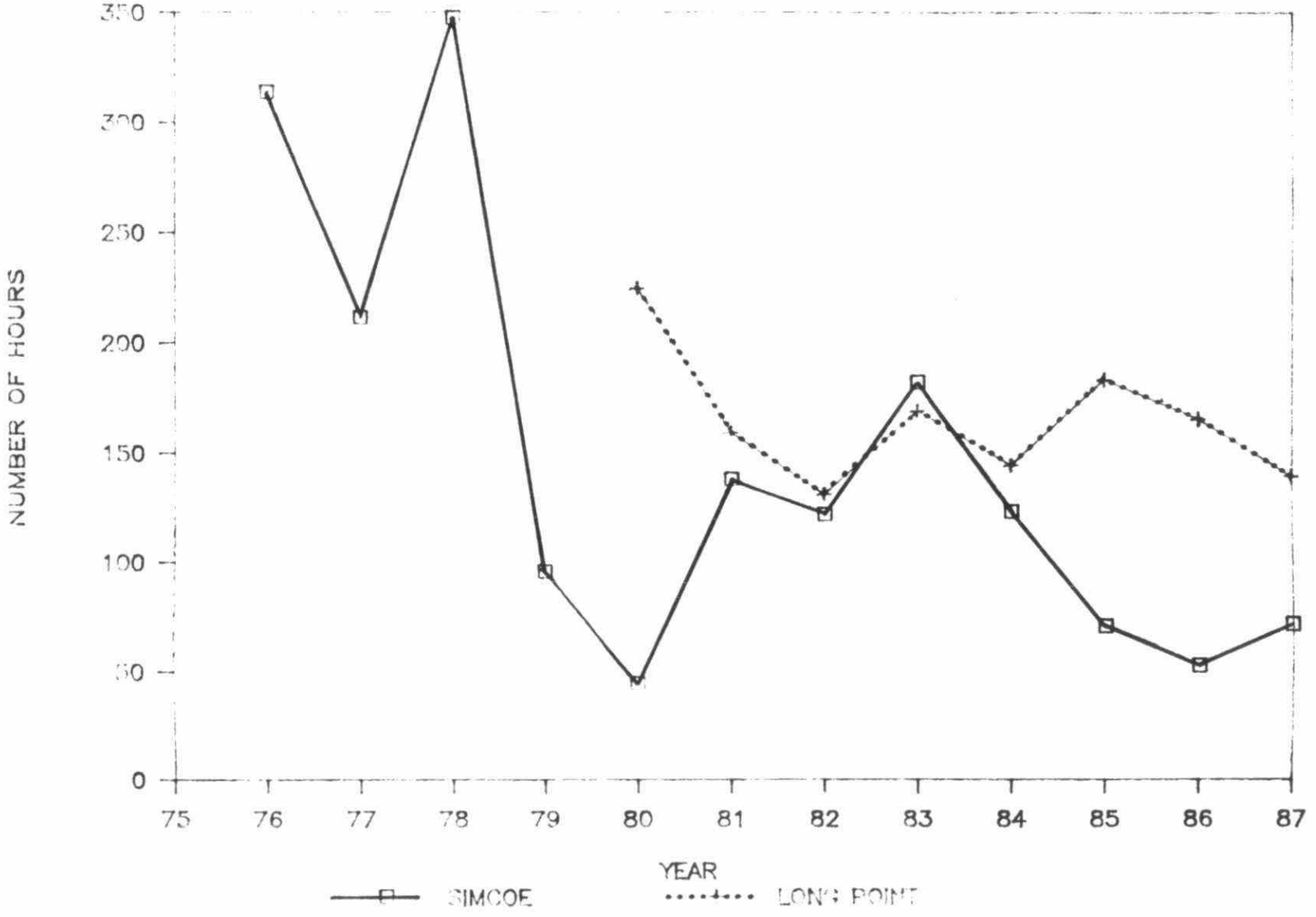


TABLE 8
SUSPENDED PARTICULATES
UNIT - MICROGRAMS PER CUBIC METRE

Ontario Objectives:-24-hour-120
1-year geometric mean - 60

	Geometric Mean 1985	1986	1987	Maximum 1987	% of Samples Above 120 (1987)
22087 Jarvis	49	44	43	344	6
22090 Port Dover	32	30	40	128	2
22092 Rainham/Sandusk	37	71	28	102	0
22904 South Walpole School	30	33	32	199	4
22907 Nanticoke Village	59	62	51	185	5
22961 Nanticoke North	45	42	37	144	4
22964 Stelco North	39	36	32	110	0
22965 Dogs Nest/Hwy 6	33	36	37	173	3

On May 9, a windstorm with southwest winds gusting up to 75 km/hr created elevated TSP concentrations throughout Southern Ontario, including in the Nanticoke network. The highest Nanticoke reading measured was in Jarvis (22087) where 344 ug/m^3 was recorded. The sources of the dust were the fugitive type, i.e. windblown dust from open fields, unpaved areas, etc.

The Jarvis station measured two other daily objective exceedences which were probably related to local sources, including a nearby baseball diamond. The station in Nanticoke Village (22907) also measured three exceedences, likely due to fugitive emissions from Stelco property. The other stations measured from zero to two exceedences and many of these were during the May 9 windstorm.

The most notable change from 1986 occurred at 22092-Rainham/Sandusk near the Ontario Hydro Generating Station, where an extreme improvement was measured. In 1986 there were 11 exceedences of the daily objective compared to none in 1987. As well, the yearly mean fell by over 60% from 71 to only 28 ug/m^3- the lowest recorded in the network.

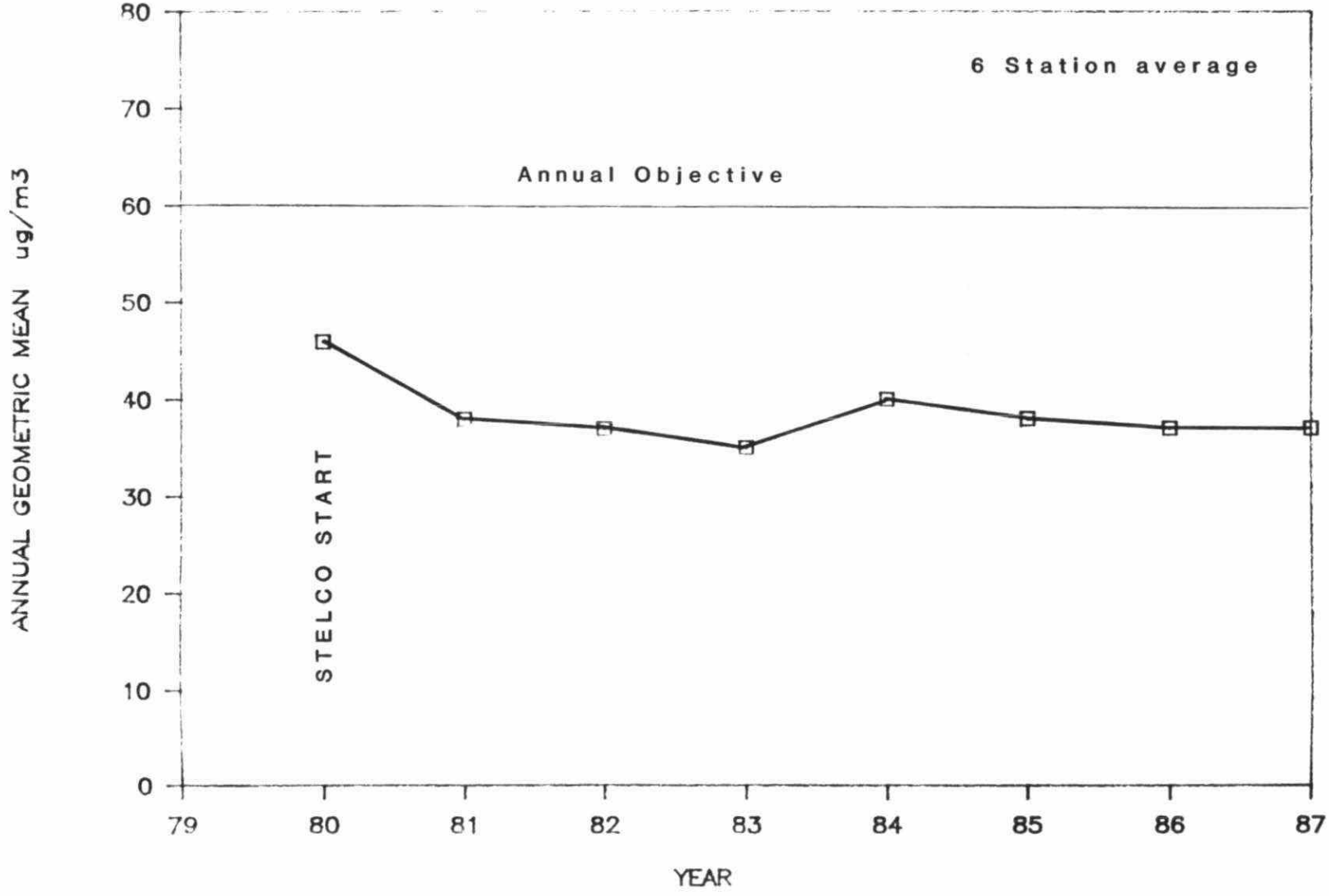
Measures to reduce windblown dust emissions at Ontario Hydro started in 1985 and continued into 1987. Although a large increase was observed in 1986, and is unaccounted for, the control program now appears to have been successful.

Another location where improvement was apparent is Nanticoke Village, near Stelco. The yearly mean fell from 62 to 51 ug/m^3- below the objective. Increased roadway oiling and other measures to reduce windblown dust at Stelco appear to have been successful.

A total of six hi-vol stations have been operating continuously since 1980 in the Nanticoke area, and the combined yearly trend of these stations is shown in Figure 14. No deterioration is evident. However, levels within Nanticoke Village, close to Stelco operations and near Ontario Hydro, could remain a local concern and trends will be carefully monitored to ensure that particulate levels remain at acceptable levels.

FIGURE 14
SUSPENDED PARTICULATE YEARLY TREND

NANTICOKE 1980 – 1987



Dustfall

Dustfall is that material which settles out of the atmosphere by gravity. It is collected in plastic containers during a 30 day exposure time. The collected material is weighed and expressed as a deposition rate of grams/m^2/30 days. The measurement is imprecise and effects are restricted to relatively local areas. Dustfall objectives are based on nuisance effects and are 7.0 grams/m^2/30 days (monthly) and 4.5 grams/m^2/30 days (yearly average). Since dustfall is comprised solely of large particles, it is not a health related parameter.

Dustfall was measured within Nanticoke Village in 1987, and data are given in Table 9. As in previous years, concentrations were low and below the monthly objective in all twelve samples.

The annual trend at this station since 1975 is given in Figure 15. An increase occurred in 1984, and concentrations have since held steady, below the yearly objective, but did show a distinct improvement in 1987.

Two dustfall jars were located near the Ontario Hydro flyash lagoon area. The monthly objective was exceeded once at 22092 and none at 22093 which lies closest to the ash lagoon area. The one exceedence occurred in January. Both stations showed distinct improvements in their annual means.

A Control Order was issued to Ontario Hydro in 1985 to reduce windblown flyash emissions. The subsequent control efforts have been successful.

Fluoridation

This measurement is a relatively crude assessment used to determine quantities of fluoride compounds in the ambient air. A lime coated paper is exposed to the atmosphere for approximately 30 days and chemically analyzed for fluoride. The fluoride objectives are based on vegetation damage and for this reason, the objective is more stringent during the growing season. For the

TABLE 9
DUSTFALL
UNITS - GRAMS/ SQ. METRE/30 DAYS

Ontario Objectives 1 month-7.0
1 year avg 4.5

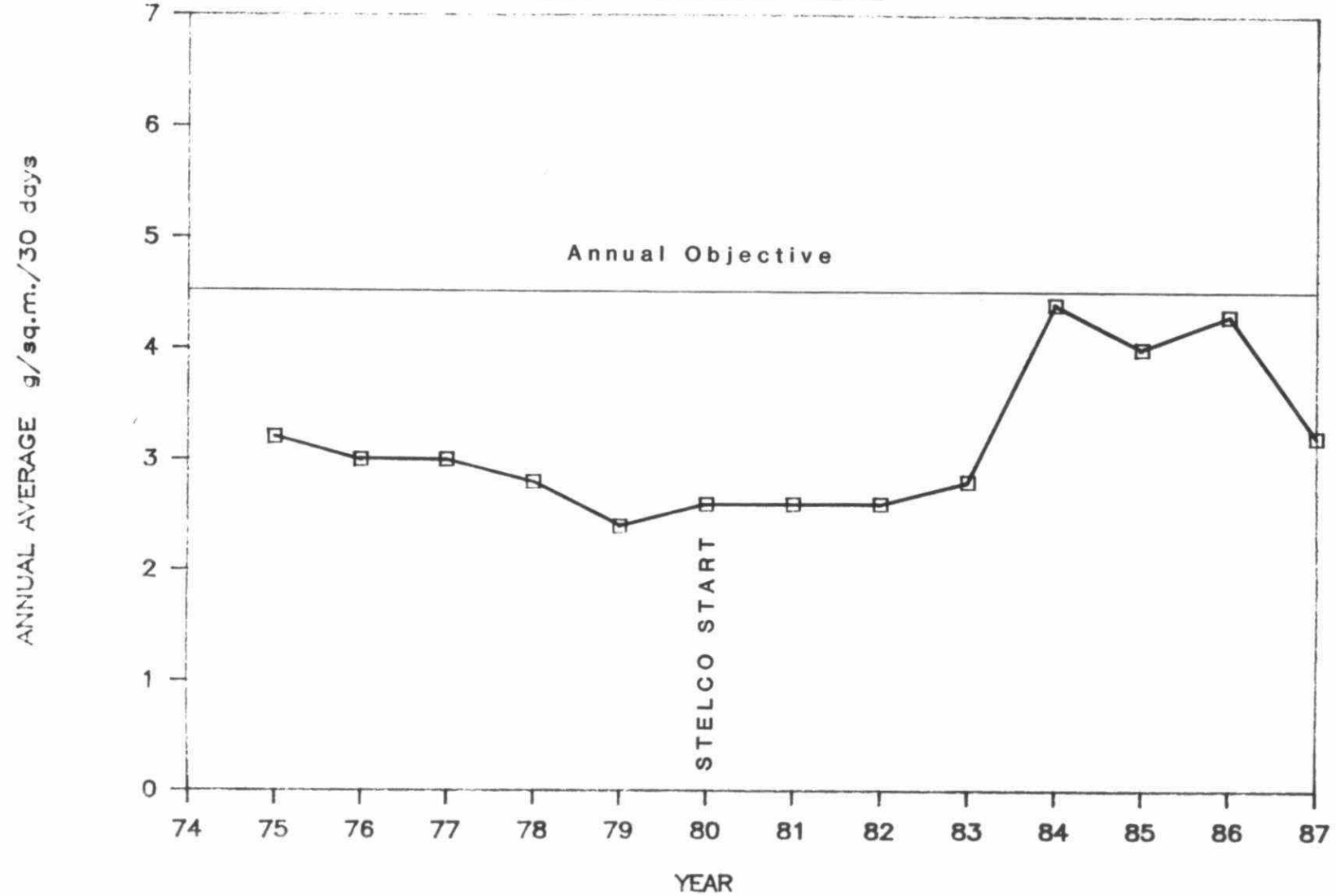
	Annual Average			1987 1-Month	No. of Months Above Objective		
	1985	1986	1987	Maximum	1985	1986	1987
22070 Nanticoke Village	3.8^{11}	4.3	3.2^{10}	4.6	0	0	0
22092 Rainham/Sandusk	2.7^{9}	4.3	2.7	11.1	0	1	1
22093 N.G.S. Flyash Area	3.7^{7}	4.8	1.8	3.2	1	2	0

Exponents refer to number of months when less than 12 valid samples.

FIGURE 15

DUSTFALL YEARLY TREND

22070 – NANTICOKE VILLAGE



period April 15 to October 15, it is 40 micrograms/100 cm^2/30 days while for the remainder of the year it is 80. A possible source of this contaminant is Stelco's basic oxygen furnace, although gas scrubbing removes most of the emissions.

Four stations surrounding Stelco property monitored fluoride and 1987 data are given in Table 10.

Concentrations remained low similar to previous years except for one station which did record four exceedences of the objectives. This station 22961 is a relatively new site, more downwind of the prevailing southwesterlies (from Stelco), and was established in 1986. The 1987 average here was significantly higher than in 1986 (although that year's data was incomplete).

The combined annual trend of the other three stations dating back to 1975 is shown in Figure 16 and indicates little change in levels. However, the deterioration at the new station 22961 is cause for some concern and future data will be monitored closely.

TABLE 10
FLUORIDATION RATE
UNITS - MICROGRAMS F/100 SQ. CM/30 DAYS

Ontario Objectives: Apr.15 to Oct. 15 - 40
Oct.16 to Apr. 14 - 80

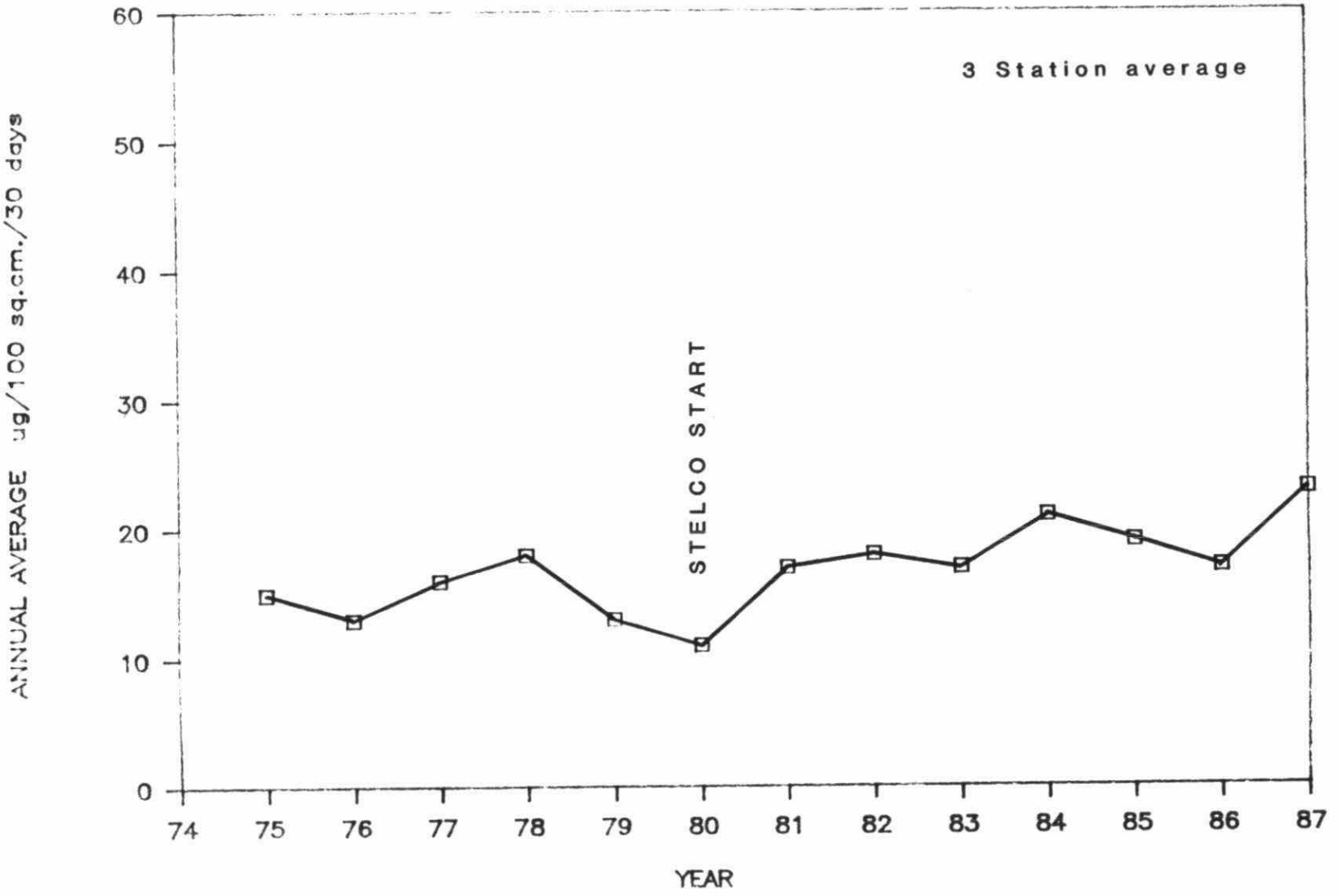
		Annual Average 1985	1986	1987	1987 1-Month Maximum	Number of Months Above Objective 1985	1986	1987
22057	Nanticoke Creek	24	21	25	48	0	0	0
22074	Texaco	18	18	23	36	0	0	0
22083	Dogs Nest	15	13	20	33	0	0	0
22961	Nanticoke North	-	32[9]	45	98	-	1	4

9 - 9 months of sampling (April - December)

FIGURE 16

FLUORIDATION RATE YEARLY TREND

NANTICOKE 1975 – 1987



SUMMARY

Overall, 1987 data in the Nanticoke area revealed that air quality is very good and reflected a relatively minor impact by the main industries. Sulphurous odours near Stelco were the main item of concern.

Pollutants such as sulphur dioxide, oxides of nitrogen, hydrocarbons and particulates showed quite low levels well within relevant objectives.

Total reduced sulphur (TRS) levels and related odour problems within Nanticoke Village continued to be a problem in 1987. Discussions with Stelco have been undertaken and the company will be required to reduce emissions. Since two potential sources of TRS exist at the plant, the Ministry is conducting a special survey on plant property to determine which one, if not both, are the main problem. A one month shutdown of the blast furnace in 1988 will also help in this regard.

Sulphur dioxide (SO_2) normally recorded zero or near zero measurements throughout the network of monitors. The Nanticoke Generating Station is the largest SO_2 source in the area but its effect on the Nanticoke area was fairly minor. Only 3 hours out of almost 100,000 hours of monitoring exceeded the hourly objective.

Particulate levels in the Region were quite low and generally showed acceptable concentrations. An improvement from 1986 was observed, but fugitive dust emissions from the Stelco mill site were still occasionally a problem, particularly under high wind conditions. Close to Ontario Hydro property, distinct improvements in both suspended particulates and dustfall readings were measured. A Control Order was issued in 1985 to Ontario Hydro to reduce windblown emissions of flyash from the ash lagoon area. The control program to date has been successful.

Fluoride levels around Stelco were generally acceptable, however, one station did record exceedences of monthly objectives and an increase over 1986 levels. Trends here will be closely monitored.

Another pollutant of concern is ozone, a product of long range transport. Elevated concentrations above objectives continued to be observed in 1987 and appeared to arrive mostly from the United States during the summer. Oxidant control will be required on an international rather than local scale.

TD
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C36
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1989